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Measuring Diversity: Importance of Species Distribution by Using Mathematical Methods

Sunil N. Khade* , Priyanka B. Gaikwad
Department of Zoology Department of Mathematics P. N. College, Pusad, District Yavatmal, Maharashtra, India

ABSTRACT

The calculation done according to Shannon Wiener Diversity Index, quadrant method use for the calculation for the concentration of diversity, Wiener index showing varies according to different habitats, so calculation explore on the possibility of ecological value, The measurement of diversity of species of four sampling stations varies according to habitat such as mangrove habitat, rocky substrata, sandy shore, and muddy habitat, present data statistically analysis done given time period, so that the index is useful for practical applications.

Keywords : Diversity, Shannon Wiener Index.

I. INTRODUCTION

index of diversity' defined by Fisher are two measures of the degree of concentration or diversity achieved when the individuals of a population are classified into groups. Both are defined as statistics to be calculated from sample data and not in terms of population constants. The index of diversity has so far been used chiefly with the logarithmic distribution. It cannot be used everywhere, as it does not always give values which are independent of sample size; it cannot do so, for example, when applied to an infinite population of individuals classified into a finite number of groups [26].

The occurrence of diversity in sea grass beds, also at greater depth in the sea, they are more diverse obtained in the rocky intertidal zone along the coast, Sandy stones, inter tidal flats, mangrove areas [1]. Mangroves are one of the biologically diverse ecosystems in the world, rich in organic matter and nutrients and support very huge biomass of flora and fauna [2]. An oysters, mussels and clams serve the nutritional needs of the coastal population they are good source of minerals, protein, and glycogen and easily digestible compared to other animal food [3]. In India, till today, 5,070 species of molluscs have been recorded of which, 3,370 are from marine [4]. The gastropods such as Sacred chank, *Trochus*, *Turbo* are exploited from the Indian marine region [5]. The present papers investigate the diversity of gastropod molluscs of mangrove, rocky coasts, sandy beach from study localities.

II. METHODS AND MATERIAL

2.1 The study area divided in four localities of Raigad district viz. [A]. Harihareshwar: (Rocky area) (Lat. 17°59.568" North and Long. 073°01.187" East). [B]. Lada: Muddy region (Lat. 18°01.686" North and Long. 073°01.752" East). [C]. Shrivardhan: Sandy beach (Lat. 18°02.556" North and Long.

073°00.598" East). [D]. Jivanabander: Rocky area (Lat. 18°03.062" North and Long. 072°59.944" East).

2.2 Live animals collected by handpicking including mangrove associated gastropod species during low tide. Five quadrates of nylon rope each 1-m² was prepared, randomly at each locality just over the bed. Twice in each season post-monsoon, winter and summer October 2015 to September 2016. Localities viz. I,II,III and IV. Soon after fishing were brought to the laboratory, the shells were brushed to clean the fouling biomass for accuracy of the measurement, then stocked in filtered seawater pumped in the laboratory from the estuaries for observation of movement, then specimens preserved in 70% alcohol for taxonomical identification of morphological characters, especially, lunal, umbo, operculum. Internal parts teeth, specimens identified by Zoological Survey of India, Kolkata.

III. RESULTS

3.1 According to quadrant method diversity noted i.e. C<IV (obtained umber of species), B<IV (obtained umber of spices), A<IV (obtained umber of spices) sites are varies from one another. At B has large swampy region with mangroves due to this reason species diversity is high. (A,B,C,D indicating name of sites)

According to Shannon Wiener Diversity Index

Name of the sites	No. of sample	pi=sample/sum	ln (pi)	pi*ln (pi)
A	21	0.31	-1.17	-0.362
B	12	0.17	-1.77	-0.300
C	03	0.04	-3.21	-0.128
D	29	0.43	-0.84	-0.361
	sum=67			Sum=-1.151

H= 1.151

H_{max}= ln(N) = ln(4)=1.38

Evenness = H/H_{max} = 1.151/1.38 =0.834

Result: Shannon diversity index (H) = 1.151

Evenness = 0.834

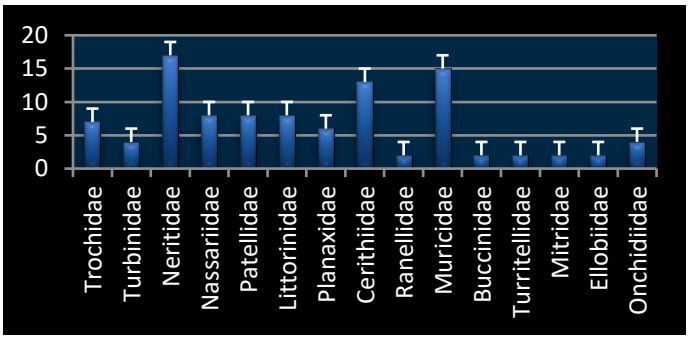

Fig. 1.Distribution of families of gastropod species from study sites.

3.2 According to "fig. 1". 4 is an indicates more diversity index showing on rocky habitats. The onchidiidae families with 02 species recorded in muddy habitats. The gastropod fourty nine spp, from fifteen families, five orders i.e. given in (Table 1). The data presented on diversity of ecological importance molluscs from muddy-mangrove, rocky as well as sandy habitats. Higher number of gastropods at site B-12, D-29, A-22, C-03 species were noted. The gastropods are playing a vital role in the homeostasis.

IV. DISCUSSION

4.1 The diversity of species from coastal sites varies significantly, the importance of ecology the relatively high temperature, high oxygen content, low wave energy and the semi-enclosed nature of the habitat. [6]. Dozens of mathematical indices have been proposed for this purpose, but these can provide contradictory results leading to misleading or incorrect conclusions about community's diversity [9]. The population density was at its peak in the month of November 2015 during post monsoon period. The mangroves support high density of every type of molluscan species especially,

Telescopium, Potamides, Natica, Nerita, and *Littorina* and *oysters*. [6].

4.2 The observation of these species populations in mangrove ecosystem is important to evaluate their condition [10].

4.3 The numerical abundance & biomass of molluscs can be equally impressive. The numerous investigation of mangroves associated molluscs in the world wide, thirty nine noted of gastropods in as Australian mangroves, [11]. Twenty three molluscs from mangroves in Hong Kong [12]. Fourty four sp., of Sematan mangrove forest of Malaysia noted [13]. A total account of Sundarban fifty six sp. of molluscs thirty one gastropods & twenty five bivalves [14]. Twelve bivalve & thirteen gastropods mangrove associated at Ratnagiri coast noted [15] thirty-nine gastropods from fifteen families from Raigad district coast noted [16]. Gastropods are typically one of the dominant, most conspicuous macrofauna in mangrove, and occupy wide range of ecological niches.

V. CONCLUSION

According to Shannon diversity index (H) = 1.151, Evenness = 0.834, number of obtained species is sum=67, and According to quadrant method diversity noted i.e. C<IV (obtained umber of species), B<IV (obtained umber of spices), A<IV (obtained umber of spices) sites of coast are varies from one another, data analysis showing at site B & D has greater commercial value & biodiversity importance, probably is influenced by their habitat & geographical condition. Site A & B probably have suitable habitat to support greater number of edible, commercial & ecological species diversity. However very little information is available on the gastropod biodiversity of mangroves. Hence, it is necessary to document the biodiversity of the group of threatened ecosystems. There in urgent need conservation & sustainable utilization of gastropod species.

VI. REFERENCES

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